Development, Manufacturing and Application of Coated Conductors at SuperOx Japan

Miyuki Nakamura*, Naoyuki Hirata, Juhyun Chung, Vladimir Vyatkin, Valery Petrykin, Sergey Lee

*SuperOx Japan, Sagamihara, Japan

*Corresponding author: nakamura@superox.co.jp

The SuperOx Japan was established in 2011 with the goal of developing and commercializing a reliable and cost-effective technology for the manufacturing of second generation high temperature superconducting (2G-HTS) tapes, to deliver affordable, highly customized 2G tapes to the market and to promote new products involving superconducting materials. The core fabrication process of 2G-HTS tapes developed by our group relies on the use of Hastelloy substrate tape, ion-beam assisted deposition (IBAD) texturing process and fabrication of superconducting layer by pulsed laser deposition (PLD) process [1,2].

At present SuperOx group became one of the leading producer of coated conductors delivering kilometers of highly customized superconducting tapes worldwide. In past 2 years we made a substantial progress in up-scaling of our production and installation of independent new high-throughput equipment in Japan and Russia. Our recent activities aimed to increase the production throughput and yield, improve the performance of 2G HTS wires and to provide a wider range of customization of our product tapes. Based on our production experience and recent cost analysis model we considering several potential pathways to reduce the final price of our wires, which based on the magnetron-IBAD-PLD production scheme and analyzing the main obstacles and possible competitiveness of this approach in comparison with other manufacturing techniques. Now we considering further upscaling of PLD from the viewpoint of recent progress in excimer laser technologies and latest results in 2G wire production and designing of PLD equipment made by SuperOx.

Currently SuperOx involved in several joint R&D and commercial projects including development and installation of 220kV and 3kV superconducting fault current limiters (SFCL), advanced cables and motors. The company business strategy emphasized gradual shift from the manufacturing of the plain superconducting tapes towards the integration of the 2G wires into the superconducting devices. In conclusion we will present our prospective projects aimed on the development of new materials, wire architectures, construction of pilot scale devices and electrical equipment where our 2G HTS wires will be utilized.